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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,109	06/23/2003	Nitin Bhate	126558	7025

41838 7590 02/18/2005

GENERAL ELECTRIC COMPANY (PCPI)
C/O FLETCHER YODER
P. O. BOX 692289
HOUSTON, TX 77269-2289

EXAMINER	
PATEL, VISHAL A	

ART UNIT	PAPER NUMBER
3676	

DATE MAILED: 02/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/601,109	BHATE ET AL.	
	Examiner	Art Unit	
	Vishal Patel	3676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *29 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 28 is recites the limitation "said brush seal" in line 8. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-2, 4 and 6-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al (US. 2001/0006601A1) in view of Turnquist et al (US. 6,045,134) and further in view of Aksit et al (US. 6,406,027).

Wilson discloses a bearing assembly (assembly having housing 104) for supporting a rotating component (106) of a rotary machine (turbine), comprising a bearing housing (104), a metallic clearance seal (metallic clearance seal at the end of 104 and adjacent to an outer surface of the rotating component 106) having at least one tooth, the metallic clearance seal attached to the bearing housing is configured to extend radially outward from the bearing housing (the metallic clearance seal extends outward from the housing toward the rotary shaft) from the bearing housing in a spaced apart relationship with the rotating component (the clearance seal extends outward toward the rotating component). The metallic clearance is a labyrinth seal (seal

having teeth). The rotating component having an outer surface (outer surface of 106). The metallic clearance seal is in a fixed radial position (this is the case due to a pin that is in the metallic clearance seal that is attached to the bearing housing) with respect to the rotating shaft.

Wilson discloses the invention substantially as claimed above but fails to disclose the metallic clearance seal having an envelope having a pre-determined cross-sectional shape, the predetermined cross-sectional shape is an inverted L-shape, a non-metallic brush seal assembly fixedly attached to the metallic clearance seal having a second predetermined cross-sectional shape, the non-metallic brush seal assembly adapted to the metallic clearance to extend through the envelope and terminate in substantially intimate contact with the rotating component and the non-metallic brush seal assembly comprises a plurality of fibers to substantially arrest leakage of a lubricant from the bearing housing to the envelope. Turnquist discloses a stationary member having a metallic clearance seal having at least one tooth (seal having tooth 24), the metallic clearance seal having an envelope that has an inverted L-shape, a brush seal assembly having a front plate, a back plate and bristles having a diameter between the plates, the bristles are disposed between the plates at angles offset from the radius of the plates, the envelope having a first cross-sectional shape that is predetermined by the brush seal, the brush seal having a second cross-sectional shape that extend in the envelope and the bristles contact a rotating shaft (10). It would have been obvious to one having ordinary skill in the art at the time the invention was made to configure the metallic clearance seal of Wilson to have a combination of metallic clearance seal having an envelope that has a brush seal inside the envelope as taught by Turnquist, to provide a fail-safe seals (column 1, lines 45-46 of Turnquist), to provide seals that

are reliable over time (column 1, lines 30-33 of Turnquist) and prevent contact or degradation of the metallic clearance (column 1, lines 31-32 of Turnquist).

Wilson and Turnquist disclose the invention substantially as claimed above but fail to disclose that a brush seal having bristles that are non-metallic, the brush seal having front plate and back plate, the bristle having a diameter and the bristles disposed between the plates at angles offset from the radius of the plates. Aksit discloses a brush seal with non-metallic bristles (24) made of Kevlar, the bristles have fibers with diameter, packing density, the fibers have an average fence height (height of fibers from plate to a rotating member), the brush seal having front and back plates, the bristles disposed between the plates at an angle offset from the radius of the plates (figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the brush seal of Wilson and Turnquist to be replaced by the brush seal of Aksit, to provide tight packing of the bristles, to reduce leakage across the brush seal and provide bristles with better strength which will result in less breakage of bristles (column 1, line 60-column 2, line 40) and to provide proper retention of the bristles (this is the case due to the shape of the backing plates of Aksit).

Wilson, Turnquist and Aksit disclose the bristles having fibers and the fiber having a diameter, stiffness and a packing density.

Regarding claims 7-8:

Wilson, Turnquist and Aksit disclose the claimed invention except the diameter of fibers is 0.2 mils to 6 mils or 0.4 mils to 1 mil. Discovering an optimum range of a result effective variable involves only routine skill in the art. In re Kulling, 895 F.2d 1147, 14 USPQ 2d 1056. Without the showing of some unexpected result. Since applicant has not shown some

unexpected result the inclusion of this limitation is considered to be a matter of choice in design. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the diameter to be 0.2 mils to 6 mils or 0.4 mils to 1 mil as a matter of design choice.

Regarding claims 9-10:

Wilson, Turnquist and Aksit disclose the claimed invention except the fibers to have stiffness of 0.2 psi/mil to 20 psi/mil or 0.4 psi/mil to 5psi/mil. Discovering an optimum range of a result effective variable involves only routine skill in the art. In re Kulling, 895 F.2d 1147, 14 USPQ 2d 1056. Without the showing of some unexpected result. Since applicant has not shown some unexpected result the inclusion of this limitation is considered to be a matter of choice in design. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the fibers having a stiffness of 0.2 psi/mil to 20 psi/mil or 0.4 psi/mil to 5psi/mil as a matter of design choice.

Regarding claims 11-12:

Wilson, Turnquist and Aksit disclose the claimed invention except the packing density to be 1000 to 300000 per square inch or 150000 to 250000 per square inch. Discovering an optimum range of a result effective variable involves only routine skill in the art. In re Kulling, 895 F.2d 1147, 14 USPQ 2d 1056. Without the showing of some unexpected result. Since applicant has not shown some unexpected result the inclusion of this limitation is considered to be a matter of choice in design. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the packing density be 1000 to 300000 per square inch or 150000 to 250000 per square inch as a matter of design choice.

Regarding claims 13-14:

Wilson, Turnquist and Aksit disclose the claimed invention except the angle is 0 degrees to 45 degrees or 20 degrees to 40 degrees. Discovering an optimum range of a result effective variable involves only routine skill in the art. In re Kulling, 895 F.2d 1147, 14 USPQ 2d 1056. Without the showing of some unexpected result. Since applicant has not shown some unexpected result the inclusion of this limitation is considered to be a matter of choice in design. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the angle to be 0 degrees to 45 degrees or 20 degrees to 40 degrees as a matter of design choice.

Regarding claims 15-16:

Wilson, Turnquist and Aksit disclose the claimed invention except the fence height to be 20 mils to about 100 mils or 30 mils to 60 mils. Discovering an optimum range of a result effective variable involves only routine skill in the art. In re Kulling, 895 F.2d 1147, 14 USPQ 2d 1056. Without the showing of some unexpected result. Since applicant has not shown some unexpected result the inclusion of this limitation is considered to be a matter of choice in design. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the fence height to be 20 mils to about 100 mils or 30 mils to 60 mils as a matter of design choice.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson in view of Trunquist.

Wilson discloses a bearing assembly (assembly having housing 104) for supporting a rotating component (106) of a rotary machine (turbine), comprising a bearing housing (104), a

metallic clearance seal (metallic clearance seal at the end of 104 and adjacent to an outer surface of the rotating component 106) having at least one tooth, the metallic clearance seal attached to the bearing housing is configured to extend radially outward from the bearing housing (the metallic clearance seal extends outward from the housing toward the rotary shaft) from the bearing housing in a spaced apart relationship with the rotating component (the clearance seal extends outward toward the rotating component). The metallic clearance is a labyrinth seal (seal having teeth). The rotating component having an outer surface (outer surface of 106).

Wilson discloses the invention substantially as claimed above but fails to disclose the metallic clearance seal having an envelope having a pre-determined cross-sectional shape, the predetermined cross-sectional shape is an inverted L-shape, a non-metallic brush seal assembly fixedly attached to the metallic clearance seal having a second predetermined cross-sectional shape, the non-metallic brush seal assembly adapted to the metallic clearance to extend through the envelope and terminate in substantially intimate contact with the rotating component and the non-metallic brush seal assembly comprises a plurality of fibers to substantially arrest leakage of a lubricant from the bearing housing to the envelope. Turnquist discloses a stationary member having a metallic clearance seal having at least one tooth (seal having tooth 24), the metallic clearance seal having an envelope that has an inverted L-shape, a brush seal assembly having a front plate, a back plate and bristles having a diameter between the plates, the bristles are disposed between the plates at angles offset from the radius of the plates, the envelope having a first cross-sectional shape that is predetermined by the brush seal, the brush seal having a second cross-sectional shape that extend in the envelope and the bristles contact a rotating shaft (10). It would have been obvious to one having ordinary skill in the art at the time the invention was

made to configure the metallic clearance seal of Wilson to have a combination of metallic clearance seal having an envelope that has a brush seal inside the envelope as taught by Turnquist, to provide a fail-safe seals (column 1, lines 45-46 of Turnquist), to provide seals that are reliable over time (column 1, lines 30-33 of Turnquist) and prevent contact or degradation of the metallic clearance (column 1, lines 31-32 of Turnquist).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson, Turnquist and Aksit as applied to claims 1-2 above, and further in view of Ingistov (US.6,226,975).

Wilson, Turnquist and Aksit disclose the invention substantially as claimed above but fail to disclose the non-metallic brush seal having anti-rotation pins affixed to the metallic clearance seal to prevent circumferential displacement of the non-metallic brush seal assembly relative to the metallic clearance seal. Ingistov discloses a metallic clearance seal (formed by 18 and 104) having a tooth (32), a brush seal (seal having bristles 44) placed inside the metallic clearance seal and the bush seal having plurality of anti-rotation pins (132) affixed to the metallic clearance to prevent circumferential displacement of the non-metallic brush seal assembly relative to the metallic clearance seal. It would have been obvious to one having ordinary skill in the art at the time the invention was made to configure the non-metallic brush seal of Wilson, Turnquist and Aksit to have an anti-rotation pin attached to the metallic clearance seal as taught by Ingistov, to prevent rotation of the non-metallic seal (column 7, line 27 of Ingistov).

7. Claims 17-19 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson, Turnquist and Aksit as applied to claim 1 above, and further in view of Short (US. 5,351,971).

Wilson, Turnquist and Aksit disclose the invention substantially as claimed above but fail to disclose the shaft to have a friction resistant layer disposed thereon and the friction resistant layer is a self-lubricating material. Short discloses a brush seal (10) having bristles placed between backing plates, the brush seal contacting a surface (surface of shaft 20 where the brush seal contacts) of a shaft (20) and one of the backing plates or shaft having a nonabrasive coating having a low friction coefficient (120 maybe applied on the shaft or backing plates, column 3, lines 35-43 of Short) that is a self-lubricating material. It would have been obvious to one having ordinary skill in the art at the time the invention was made to configure the outer surface of the shaft of Wilson, Turnquist and Aksit to have a friction resistant layer placed on the outer surface as taught by Short, to provide a surface with low friction coefficient, non-abrasiveness and self lubricating surface (column 3, lines 35-43 of Short).

Regarding claim 20:

Wilson, Turnquist, Aksit and Short disclose the claimed invention except the diameter of fibers is 0.4 mils to 1 mil. Discovering an optimum range of a result effective variable involves only routine skill in the art. In re Kulling, 895 F.2d 1147, 14 USPQ 2d 1056. Without the showing of some unexpected result. Since applicant has not shown some unexpected result the inclusion of this limitation is considered to be a matter of choice in design. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the diameter to be 0.4 mils to 1 mil as a matter of design choice.

Regarding claim 21:

Wilson, Turnquist, Aksit and Short disclose the claimed invention except the fibers to have stiffness of 0.4 psi/mil to 5psi/mil. Discovering an optimum range of a result effective

variable involves only routine skill in the art. In re Kulling, 895 F.2d 1147, 14 USPQ 2d 1056. Without the showing of some unexpected result. Since applicant has not shown some unexpected result the inclusion of this limitation is considered to be a matter of choice in design. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the fibers having a stiffness of 0.4 psi/mil to 5psi/mil as a matter of design choice.

Response to Arguments

8. Applicant's arguments filed 11/29/04 have been fully considered but they are not persuasive.

The argument that the references fails to teach an envelop for receiving a brush seal assembly is not persuasive since Trunquist clearly teaches to have an envelop in a metallic clearance seal to hold a brush seal (32).

The argument that the references do not teach a fixed radial position with respect to a rotation component is not persuasive since Wilson clearly teaches this (this is the case due to a pin that is in the metallic clearance seal that is attached to the bearing housing).

The argument that Trunquist cannot be combined with Aksit is not persuasive since the examiner has provided motivation that replacing metallic brush seal by a non metallic brush seal is to provide tight packing of the bristles, to reduce leakage across the brush seal and provide bristles with better strength which will result in less breakage of bristles (column 1, line 60-column 2, line 40) and to provide proper retention of the bristles (this is the case due to the shape of the backing plates of Aksit).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vishal Patel whose telephone number is (703) 308-8495. The examiner can normally be reached on Monday through Friday from 7:30 PM to 4:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Heather Shackelford, can be reached on (703) 308-2978.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-2168. Technology Center 3600 Customer Service is available at 703-308-1113. General Customer Service numbers are at 800-786-9199 or 703-308-9000. Fax Customer Service is available at 703-872-9325.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to: 703-872-9326, for formal communications for entry before Final action: or,
703-872-9327, for formal communications for entry after Final action.

Hand-delivered responses should be brought to Crystal Park Five, 2451 Crystal Drive, Arlington, Virginia, Seventh Floor (Receptionist suite adjacent to the elevator lobby).

VP
February 16, 2005

ALISON PICKARD
Primary Patent Examiner
Tech. Center 3600